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(12) **United States Patent**
Osman

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(54) **INTEGRATION OF TRACKED FACIAL FEATURES FOR VR USERS IN VIRTUAL REALITY ENVIRONMENTS**

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H04N 13/344 (2018.05); *H04N 13/383*
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(58) **Field of Classification Search**

None

See application file for complete search history.

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(*) Notice: Subject to any disclaimer, the term of this
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(Continued)

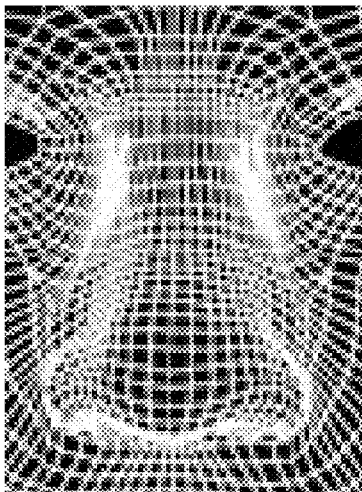
(52) **U.S. Cl.**
CPC *G06T 19/006* (2013.01); *A63F 13/00*
(2013.01); *A63F 13/25* (2014.09); *A63F*
13/525 (2014.09); *A63F 13/803* (2014.09);
G02B 27/0093 (2013.01); *G02B 27/017*
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(57) **ABSTRACT**

A method for rendering a virtual reality (VR) scene viewable via a head mounted display (HMD) is provided. The method includes detecting eye gaze of a user using one or more eye gaze sensors disposed in a display housing of the HMD. And, capturing images of a mouth of the user using one or more cameras disposed on the HMD, wherein the images of the mouth include movements of the mouth. Then, the method includes generating a virtual face of the user. The virtual face includes virtual eye movement obtained from the eye gaze of the user and virtual mouth movement obtained from said captured images of the mouth. The method includes presenting an avatar of the user in the VR scene with the virtual face. The avatar of the user is viewable by another user having access to view the VR scene from a perspective that enables viewing of the avatar having the virtual face of the user. Facial expressions and movements of the mouth of the user wearing the HMD are viewable by said other user, and the virtual face of the user is presented without the HMD.

22 Claims, 15 Drawing Sheets

wider nose



Model

pre-generated models, or
model generated from
sensor data capturing
geometric surfaces of the
nose